Summary of the Claims:

1. Previously Cancelled
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29. Previously Cancelled

30. (Previously Amended) A computer readable memory that upon execution by a computer processor carries out the following functions:

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a) alters at least one supersecondary structure parameter value of a protein backbone structure from a protein;

b) correlates a group of potential rotamers for residue positions of said protein backbone structure; and

c) analyzes the interaction of each potential rotamer from said group with all or part of i) said protein backbone structure, ii) potential rotamers at each other said residue positions, or iii) any rotamers from said protein, to generate a set of optimized protein sequences.

31. Previously Cancelled

32. Previously Cancelled

33. Previously Cancelled

34. Previously Cancelled

35. Previously Cancelled

36. (Previously Amended) A computer readable memory that upon execution by a computer processor carries out the following functions:

    a) alters at least one supersecondary structure parameter value of a protein backbone structure from a protein;

    b) correlates a group of potential amino acids for residue positions of said protein backbone structure; and

    c) analyzes the interaction of each of potential amino acids from said group with all or part of i) said protein backbone structure, ii) potential amino acids at each other said residue positions, or iii) any amino acids from said protein, to generate a set of optimized protein sequences.

37. Previously Cancelled

38. Previously Cancelled

39. Previously Cancelled

40. (Currently Amended) A computer readable memory that upon execution by a computer processor carries out the following functions:

    (A a) receives a protein backbone structure with variable residue positions from a protein;

    (B b) alters at least one supersecondary structure parameter value of said protein backbone structure prior to establishing a group of potential amino acids;

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(C̶c) establishes a group of potential amino acids for each of said variable residue positions, wherein a first group for a first variable position has a first set of at least two amino acid side chains, and wherein a second group for a second variable position has a second set of at least two different amino acid side chains, and wherein said sets are different; and

(D̶d) analyzes the interaction of each potential amino acid from said group with all or part of i) said protein backbone structure, ii) potential amino acids at each other said variable position, or iii) any amino acids from said protein, to generate a set of optimized protein sequences.

41. (Previously Added) A computer readable memory according to claim 40 wherein said first and second sets of amino acids are different.

42. (Previously Added) A computer readable memory according to claim 40 wherein said first and second sets of amino acids are the same.

43. (Previously Added) A computer readable memory that upon execution by a computer processor carries out the following functions:

a) receives a protein backbone structure with variable residue positions;

b) alters at least one supersecondary structure parameter value of said protein backbone structure prior to establishing a group of potential residue positions;

c) establishes a group of potential rotamers for each of said variable residue positions, wherein the group for at least one variable residue position has rotamers of at least two different amino acid side chains, and wherein at least one of said amino acid side chains is from a hydrophilic amino acid; and,

d) analyzes the interaction of each of said rotamers with all or part of the remainder of said protein to generate a set of optimized protein sequences, wherein said analyzing step includes the use of at least one scoring function.

44. (Previously Amended) A computer readable memory according to claim 43 wherein said amino acid side chains are different.

45. (Previously Amended) A computer readable memory according to claim 43 wherein said amino acid side chains are the same.

46. (Previously Added) A computer readable memory according to claim 43 wherein said hydrophilic

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amino acid is selected from the group consisting of serine, threonine, aspartic acid, asparagine, glutamine, glutamic acid, arginine, lysine, and histidine.

47. (Currently Amended) A computer readable memory according to claims 40 or 43 wherein step d) further comprises a ranking module.

48. Previously Cancelled

49. (Currently Amended) A computer readable memory according to claim 30 wherein step c) further comprises a ranking module.

50. (Currently Amended) A computer readable memory according to claim ~~30~~ 49 wherein said ranking module includes a van der Waals scoring function component.

51. (Currently Amended) A computer readable memory according to claim ~~30~~ 49 wherein said ranking module includes an atomic solvation scoring function component.

52. (Currently Amended) A computer readable memory according to claim ~~30~~ 49 wherein said ranking module includes a hydrogen bond scoring function component.

53. (Currently Amended) A computer readable memory according to claim ~~30~~ 49 wherein said ranking module includes a secondary structure scoring function component.

54. (Previously Added) A computer readable memory according to claim 30 that further assess the correspondence between potential energy test results and theoretical potential energy data.

55. (Previously Added) A computer readable memory according to claims 30, 36 or 49-53 further comprising physically generating at least one member of said set of optimized protein sequences and experimentally testing said sequence for a desired function.

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